

This Page Is Inserted by IFW Operations  
and is not a part of the Official Record

## **BEST AVAILABLE IMAGES**

Defective images within this document are accurate representations of the original documents submitted by the applicant.

Defects in the images may include (but are not limited to):

- BLACK BORDERS
- TEXT CUT OFF AT TOP, BOTTOM OR SIDES
- FADED TEXT
- ILLEGIBLE TEXT
- SKEWED/SLANTED IMAGES
- COLORED PHOTOS
- BLACK OR VERY BLACK AND WHITE DARK PHOTOS
- GRAY SCALE DOCUMENTS

**IMAGES ARE BEST AVAILABLE COPY.**

**As rescanning documents *will not* correct images,  
please do not report the images to the  
Image Problem Mailbox.**



# UNITED STATES PATENT AND TRADEMARK OFFICE

UNITED STATES DEPARTMENT OF COMMERCE  
United States Patent and Trademark Office  
Address: COMMISSIONER FOR PATENTS  
P.O. Box 1450  
Alexandria, Virginia 22313-1450  
www.uspto.gov

APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/067,429	02/05/2002	Frederik Visser	NL010061	7862
24737	7590	02/20/2004	EXAMINER FETZNER, TIFFANY A	
PHILIPS INTELLECTUAL PROPERTY & STANDARDS P.O. BOX 3001 BRIARCLIFF MANOR, NY 10510			ART UNIT 2859	PAPER NUMBER

DATE MAILED: 02/20/2004

Please find below and/or attached an Office communication concerning this application or proceeding.

h.v

<b>Office Action Summary</b>	Application No. 10/067,429	Applicant(s) VISSER ET AL.	
	Examiner Tiffany A Feltzner	Art Unit 2859	

-- The MAILING DATE of this communication appears on the cover sheet with the corresponding address --

**Period for Reply**

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133).
- Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

**Status**

- 1) ☒ Responsive to communication(s) filed on 01 December 2003.
- 2a) ☐ This action is **FINAL**.      2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

**Disposition of Claims**

- 4) ☒ Claim(s) 1-16 is/are pending in the application.
- 4a) Of the above claim(s) \_\_\_\_\_ is/are withdrawn from consideration.
- 5) ☐ Claim(s) \_\_\_\_\_ is/are allowed.
- 6) ☒ Claim(s) 1-16 is/are rejected.
- 7) ☐ Claim(s) \_\_\_\_\_ is/are objected to.
- 8) ☐ Claim(s) \_\_\_\_\_ are subject to restriction and/or election requirement.

**Application Papers**

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☒ The drawing(s) filed on 16 June 2003 is/are: a) ☒ accepted or b) ☐ objected to by the Examiner.  
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).  
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

**Priority under 35 U.S.C. §§ 119 and 120**

- 12) ☒ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).  
a) ☒ All   b) ☐ Some \* c) ☐ None of:  
1. ☒ Certified copies of the priority documents have been received.  
2. ☐ Certified copies of the priority documents have been received in Application No. \_\_\_\_\_.  
3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).  
\* See the attached detailed Office action for a list of the certified copies not received.
- 13) ☐ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. § 119(e) (to a provisional application) since a specific reference was included in the first sentence of the specification or in an Application Data Sheet. 37 CFR 1.78.  
a) ☐ The translation of the foreign language provisional application has been received.
- 14) ☐ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. §§ 120 and/or 121 since a specific reference was included in the first sentence of the specification or in an Application Data Sheet. 37 CFR 1.78.

**Attachment(s)**

- 1) ☒ Notice of References Cited (PTO-892)      4) ☐ Interview Summary (PTO-413) Paper No(s). \_\_\_\_\_
- 2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)      5) ☐ Notice of Informal Patent Application (PTO-152)
- 3) ☐ Information Disclosure Statement(s) (PTO-1449) Paper No(s) \_\_\_\_\_      6) ☐ Other: \_\_\_\_\_

### DETAILED RCE ACTION

1. A request for continued examination under 37 CFR 1.114, including the fee set forth in 37 CFR 1.17(e), was filed in this application after final rejection (i.e. on December 1<sup>st</sup> 2003). Since this application is eligible for continued examination under 37 CFR 1.114, and the fee set forth in 37 CFR 1.17(e) has been timely paid, the finality of the previous Office action has been withdrawn pursuant to 37 CFR 1.114. Applicant's submission filed on October 23<sup>rd</sup> 2003 has been entered.
2. This application currently names joint inventors. In considering patentability of the claims under 35 U.S.C. 103(a), the examiner presumes that the subject matter of the various claims was commonly owned at the time any inventions covered therein were made absent any evidence to the contrary. Applicant is advised of the obligation under 37 CFR 1.56 to point out the inventor and invention dates of each claim that was not commonly owned at the time a later invention was made in order for the examiner to consider the applicability of 35 U.S.C. 103( c ) and potential 35 U.S.C. 102(e), (f) or (g) prior art under 35 U.S.C. 103(a).

### Priority

3. Receipt is acknowledged of papers submitted under 35 U.S.C. 119(a)-(d), which papers have been placed of record in the file. The examiner notes that a certified English translation of the Priority document has not been submitted therefore, the **Bock et al.**, references listed under not applied prior art or record, are still valid references available as prior art under 35 USC 102 ( e ).

### **Drawings**

4. The proposed red-ink drawing correction to figure 1 of June 16<sup>th</sup> 2003, which labels Figure 1 as prior art is approved by the examiner

### **Specification**

5. The objections to the disclosure from the May 2<sup>nd</sup> 2003 office action are rescinded in view of applicant's June 16<sup>th</sup> 2003 amendment.

### **Claim Objections**

6. **Claims 1 and 9** are objected to because **Regarding claims 1 and 9** the phrase "**such that**" renders the claim indefinite because it is unclear whether the limitations following the phrase are part of the claimed invention. See MPEP § 2173.05(d).

7. The objections to **claim 1** from the earlier final office action is rescinded in view of applicant's October 23<sup>rd</sup> 2003 amendment after-final rejection, which amends claim 1 to overcome the examiner's objection.

### **Response to Arguments**

8. In response to applicant's argument in the **October 23<sup>rd</sup> 2003 response** that the references fail to show certain features of applicant's invention, it is noted that the features upon which applicant relies (i.e., a switching assembly) is taught by the cited prior art [See the rejections below.] The examiner notes that the art applied meets the limitations of the claims as written. The examiner suggests that a telephone interview between the examiner, applicant's representative, and one of the inventors may be helpful, because **what is claimed and what is argued, is not the same**. The location

of **when** and **where the signal combining steps occur** in relation to the other RF signals, receivers, and features of the independent claims is not claimed. The specifics of **which signals are combined is also not claimed**. The claims only require the combining of signals to be based upon selected imaging parameters, with at least two signals being combined.

9. Applicant's arguments filed June 16<sup>th</sup> 2003 have also been fully considered but they are not persuasive. Figure 5 of **Vij et al.**, shows that the signals from loops 40, 42, 44 and 46 are separately received.] **Vij et al** teaches the imaging parameters, gradient means, and excitation means of a typical axial imaging sequence generate NMR signals that are detected by the RF coils and recorded as an NMR signal. [See col. 1 lines 13-61].

10. **Vij et al** also teaches and shows "decoupling circuit 64" which is a functional "control unit that selectively routes at least one detected rf signal towards separate receiver channels; combining networks 82, 86 "combining the RF signals of at least two RF coils" [See Figure 5] **depending** on the imaging parameters and applying the combined RF signals to separate receiver channels, **such that at least two detected RF signals** (I.e. 66, 68; or 62, 70) **can be combined to form a combined signal** (I.e. 84, or 88) **and the combined signal** (I.e. 84, or 88) **is applied to one particular receiver channel.**" [See the inputs 88 and 84 which are single channel outputs from the combined channel inputs of combining network 82, 86; that are fed into hybrid combiner 90 to produce final output signal 92]. The examiner also notes that applicant should see

Art Unit: 2859

Figure 5, decoupling circuit 64, combining networks 82, 86, output signals 84, 88, and hybrid combiner 90, col. 6 line 62 through col. 8 line 63.

11. With respect to applicant's argument that the quadrature signals of **Burl et al.**, are not applied to a single receiver channel. The examiner notes that col. 5 lines 38-40 specifically teach combining quadrature signals as a single channel. Therefore applicant's argument of page 9 paragraph 2 through page 10 paragraph 2 of the June 13<sup>th</sup> 2003 amendment response is not persuasive.

12. With respect to applicant's arguments that the dependent claims should be allowed because the independent claim rejections should be withdrawn, [See the June 13<sup>th</sup> 2003 amendment response page 10 paragraph 3 through page 11 paragraph 2] the examiner is not persuaded.

### **Claim Rejections - 35 USC § 102**

13. The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

A person shall be entitled to a patent unless –

(b) the invention was patented or described in a printed publication in this or a foreign country or in public use or on sale in this country, more than one year prior to the date of application for patent in the United States.

(e) the invention was described in (1) an application for patent, published under section 122(b), by another filed in the United States before the invention by the applicant for patent or (2) a patent granted on an application for patent by another filed in the United States before the invention by the applicant for patent, except that an international application filed under the treaty defined in section 351(a) shall have the effects for purposes of this subsection of an application filed in the United States only if the international application designated the United States and was published under Article 21(2) of such treaty in the English language.

14. **Amended Claims 1, 7, 9** are rejected under **35 U.S.C. 102(b)** as being anticipated by **Vij et al.**, US patent 5,370,118.

15. With respect to **Twice Amended Claim 1**, and corresponding **Twice Amended method claim 9, Vij et al.**, teaches and shows "A magnetic resonance imaging apparatus / method comprising: an RF coil system comprising at least two sets of at least two RF coils which detects RF signals from a region of interest," [See abstract, Figure 5, col. 4 lines 7-25] "at least two receiver channels which receive and process the detected RF signals," [See Figure 5, which suggests at least four channels (i.e. 62, 70; 66, 68) "and a "control unit" [See Decoupling circuit 64 taught in col. 7 lines 43-54 to include a diode that may be forward biased by an independent source of DC power to allow a current to flow across capacitor 50. Because the conditions of forward biasing control when each of the four coils (i.e. 40, 42, 44, 46) are active, decoupling circuit 64 is a control unit "which controls at least one switch that selectively routes at least one detected rf signal towards separate receiver channels, said at least one detected RF signal is combined with an RF signal of at least two RF coils" [See Figure 5 combining networks 82, 86]" as amended by applicant. **Vij et al.**, depending on the imaging parameters, said control unit applies the combined RF signals to separate receiver channels, such that at least two detected RF signals (i.e. 66, 68; or 62, 70) can be combined to form a combined signal (i.e. 84, or 88) and the combined signal (i.e. 84, or 88) is applied to one particular receiver channel." [See the inputs 88 and 84 which are single channel outputs from the combined channel inputs of combining network 82, 86; that are fed into hybrid combiner 90 to produce final output signal 92]. The examiner also notes that applicant should see Figure 5, decoupling circuit 64, combining networks



Art Unit: 2859

82, 86, output signals 84, 88, and hybrid combiner 90, col. 6 line 62 through col. 8 line 63. [See also the response to arguments given above.]

16. With respect to **Amended Claim 7, Vij et al.**, teaches and shows "said control unit is provided to select and/or combine the RF signals of at least two RF coils." [See Figure 5 combining networks 82, 86, and hybrid combiner 90, col. 6 line 62 through col. 8 line 63.] "is provided to select and/or combine the RF signals of at least two RF coils depending on the phase encoding direction."

17. **Amended Claims 1-7, 9 and newly added claims 10-15** are rejected under **35 U.S.C. 102( e )** as being anticipated by **Burl et al.**, US patent 6,377,044 issued April 23<sup>rd</sup> 2002, filed March 1<sup>st</sup> 2000.

18. With respect to **Amended Claim 1, Burl et al.**, teaches and shows "A magnetic resonance imaging apparatus comprising: an RF coil system comprising at least two sets of at least two RF coils which detects RF signals from a region of interest," [See Figure 4 where: coils 100<sub>1</sub>, 100<sub>2</sub>, 100<sub>3</sub>, 100<sub>4</sub>, comprise a first set of four coils; coils 102<sub>1</sub>, 102<sub>2</sub>, 102<sub>3</sub>, 102<sub>4</sub> comprise a second set of four coils; or coils (100<sub>1</sub>, and 102<sub>1</sub>), (100<sub>2</sub> and 102<sub>2</sub>), (100<sub>3</sub>, and 102<sub>3</sub>), and (100<sub>4</sub>, and 102<sub>4</sub>) comprise four sets of two coils as taught in col. 4 lines 24-49 ] **Burl et al.**, also teaches and shows "at least two receiver channels which receive and process the detected RF signals" [See Figures 1 through 4]

19. **Burl et al.**, also teaches and shows "a control unit" [See switch assembly 40; receivers 46, 48 Figures 1-4; the sequence control processor, and teachings of col. 4 line 18 through col. 5 line 49] which controls at least one switch (i.e. switch circuit 40; switch assembly 44<sub>1</sub>, 44<sub>2</sub> and pin diodes 80, 82; col. 4 line 8 through col. 5 line 42) that

selectively routes (i.e. via the presence or absence of the DC biasing potential) "at least one detected RF signal towards separate receiver channels, said at least one detected RF signal is combined with an RF signal of at least two RF coils" [See Figures 1-4] "depending on the imaging parameters, said control unit applies the combined RF signals to separate receiver channels, [See col. 4 lines 18-42; and col. 4 line 60 through col. 5 line 5 where the specified imaging parameters, controlled by sequence control processor 50, generate or initiate, the presence or absence of a DC biasing potential that controls the functional mode of the **Burl et al.**, apparatus. The biasing potential is responsible for "applying the selected and/or the combined RF signals to the separate receiver channels, such that at least two detected RF signals" (i.e. the quadrature and antiquadrature signals) "can be combined to form a combined signal" [See col. 5 lines 20-23] "and the combined signal is applied to one particular receiver channel." [See the sequence control processor, and teachings of col. 4 line 18 through col. 5 line 49, especially col. 5 lines 38 to 40 where the quadrature signals of butterfly, loop, ladder (i.e. a planar birdcage coil) are taught to be combined as a single channel and the response to arguments given above.]

20. With respect to **Amended Claim 9, Burl et al.**, teaches and shows "A magnetic resonance imaging method, comprising the steps of: detecting RF signals from a region of interest while using an RF coil system comprising at least two sets of at least two RF coils", [See Figure 4 where: coils 100<sub>1</sub>, 100<sub>2</sub>, 100<sub>3</sub>, 100<sub>4</sub>, comprise a first set of four coils; coils 102<sub>1</sub> 102<sub>2</sub> 102<sub>3</sub> 102<sub>4</sub> comprise a second set of four coils; or coils (100<sub>1</sub>, and 102<sub>1</sub>), (100<sub>2</sub> and 102<sub>2</sub>), (100<sub>3</sub>, and 102<sub>3</sub>), and (100<sub>4</sub>, and 102<sub>4</sub>) comprise four sets of two

Art Unit: 2859

coils as taught in col. 4 lines 24-49 ] "receiving and processing the detected RF signals while using at least two receiver channels, [See Figures 1 through 4; col. 4 line 18 through col. 5 line 49] "and controlling at least one switch (i.e. the presence or absence of a DC biasing potential controls the switch circuit 40 and assembly components 44<sub>1</sub>, and 44<sub>2</sub>, because the DC potential determines how pin diodes 80 and 82 operate, and the MRI operator is additionally capable of controlling the switch assembly, and operating mode. [See col. 4 line 60 through col. 5 line 42; col. 4 lines 8-59]) that selectively routes at least one detected RF signal towards separate receiver channels for combining the RF signals of at least two RF coils" [See Figures 1-4; col. 5 lines 6-42; col. 4 line 43 through col. 5 line 5] depending on the imaging parameters and for applying the combined RF signals to separate receiver channels, such that at least two detected RF signals can be combined to form a combined signal (and the combined signal) is applied to one particular receiver channel." [See the sequence control processor, and teachings of col. 4 line 18 through col. 5 line 49; and the rejection reasons of amended claim 1 which need not be reiterated.]

21. With respect to **Amended apparatus Claim 2**, and **corresponding New method claim 11, Burl et al.**, teaches and shows "said control unit is provided to combine the RF signals of several groups of at least two RF coils (i.e coils 100<sub>1</sub>, 100<sub>2</sub>, 100<sub>3</sub>, 100<sub>4</sub>, comprise a first set of four coils; coils 102<sub>1</sub> 102<sub>2</sub> 102<sub>3</sub> 102<sub>4</sub> comprise a second set of four coils; or coils (100<sub>1</sub>, and 102<sub>1</sub>), (100<sub>2</sub> and 102<sub>2</sub>), (100<sub>3</sub>, and 102<sub>3</sub>), and (100<sub>4</sub>, and 102<sub>4</sub>) comprise four sets of two coils as taught in col. 4 lines 24-49 ], "into a

separate receiver channel." [See the sequence control processor, and teachings of col. 4 line 18 through col. 5 line 49]

22. With respect to **Amended apparatus Claim 3**, and **corresponding New method claim 12, Burl et al.**, teaches and shows "said RF coil system (9, 10, 11, 12) comprises two sets of four RF coils." [See Figure 4 where: coils 100<sub>1</sub>, 100<sub>2</sub>, 100<sub>3</sub>, 100<sub>4</sub>, comprise a first set of four coils; coils 102<sub>1</sub> 102<sub>2</sub> 102<sub>3</sub> 102<sub>4</sub> comprise a second set of four coils; or coils (100<sub>1</sub>, and 102<sub>1</sub>), (100<sub>2</sub> and 102<sub>2</sub>), (100<sub>3</sub>, and 102<sub>3</sub>), and (100<sub>4</sub>, and 102<sub>4</sub>) comprise four sets of two coils as taught in col. 4 lines 24-49 ]

23. With respect to **Amended apparatus Claim 4**, and **corresponding New method claim 13, Burl et al.**, teaches and shows "a birdcage head coil arrangement." [See col. 3 lines 30 through col. 4 line 17; Figure 1 component 28; col. 1 lines 33-47; and col. 5 lines 41-42 which teaches that the head piece coils, (i.e. the birdcage style head coils shown in Figure 1), can be conveyed to separate receiver channels.]

24. With respect to **Amended apparatus Claim 5**, and **corresponding New method claim 14, Burl et al.**, teaches and shows "said control unit is provided to combine the RF signals of RF coils arranged on opposite sides of the head." [See Figure 1 the sequence control processor component 50, and teachings of col. 3 line 30 through col. 5 line 49]

25. With respect to **Amended apparatus Claim 6**, and **corresponding New method claim 14, Burl et al.**, teaches and shows "said control unit is provided to combine the RF signals of neighboring RF coils." [See Figure 1 the sequence control

Art Unit: 2859

processor component 50, and teachings of col. 3 line 30 through col. 5 line 49, especially col. 5 lines 23-42]

26. With respect to **Amended apparatus Claim 7**, and **corresponding New method claim 15, Burl et al.**, teaches and shows "said control unit is provided to select and/or combine the RF signals of at least two RF coils **depending** on the phase encoding direction." [See Figures 1, 2, 3, the sequence control processor component 50, and teachings of col. 3 line 30 through col. 5 line 49]

***Claim Rejections - 35 USC § 103***

27. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

28. The factual inquiries set forth in *Graham v. John Deere Co.*, 383 U.S. 1, 148 USPQ 459 (1966), that are applied for establishing a background for determining obviousness under 35 U.S.C. 103(a) are summarized as follows:

1. Determining the scope and contents of the prior art.
2. Ascertaining the differences between the prior art and the claims at issue.
3. Resolving the level of ordinary skill in the pertinent art.
4. Considering objective evidence present in the application indicating obviousness or nonobviousness.

29. **Amended Claim 8** is rejected under **35 U.S.C. 103(a)** as being unpatentable over **Burl et al.**, US patent 6,377,044 as applied to **Amended claims 1-7**, and **9** above, and further in view of **Pruessmann et al.**, article "SENSE: Sensitivity encoding for Fast MRI" Magnetic Resonance in Medicine 42: pages 952-962 1999.

30. With respect to **Amended apparatus Claim 8**, and **corresponding method claim 16, Burl et al.**, teaches and shows "said control unit is provided to select and/or combine the RF signals of at least two RF coils" [See Figures 1 through 4; col. 4 line 18 through col. 5 line 49].

31. **Burl et al.**, lacks directly teaching that the "selection and/or combination of the RF signals of at least two RF coils is depending on the desired SENSE reduction direction." However, SENSE, a conventional MRI multi-coil encoding procedure developed originally by Pruessmann et al., in 1999, is usable with FFE (i.e. fast field echo), TSE (i.e. turbo spin-echo), and half-Fourier EPI (i.e. echo-planar imaging) procedures, [See Pruessmann et al., page 958 col. 2 discussion paragraph] and Burl et al., teaches the use of numerous procedures with the Burl et al., device including: "any of a plurality of magnetic resonance imaging and spectroscopy sequences, such as echo-planar imaging, echo-volume imaging, gradient and spin-echo imaging, fast spin echo imaging and the like." [See **Burl et al.**, col. 4 lines 18-23] Therefore, It would have been obvious to one of ordinary skill in the art, at the time that the invention was made to modify the teaching of **Burl et al.**, to include SENSE MRI techniques because the type of imaging sequences for which SENSE is known to be usable, are producible by **Burl et al.**, apparatus.

32. Additionally, **Pruessmann et al.**, teaches and suggests that in conventional SENSE MRI methodology the reduction factor is bound by the number of coils used. [See page 953 col. 2 the first full paragraph], and that the geometry factor, (i.e. the arrangement of the coils around a patient, such as the arrangements shown on page

957 in Figure 3 of col. 1, and the phantom experiments section of page 957) of SENSE methodology allows the coil configuration to be freely optimized with respect to SNR, independently of coil and slice geometry. [See page 960 col. 1 paragraph 1 and page 960 col. 1 conclusion paragraph 1.] This teaching suggests that the used of a SENSE method results in an inherent reduction factor, related to the number of coils used or selected, and that the actual geometrical positioning of the coils is important, and also suggests applicant's limitation that the "selection and/or combination of the RF signals of at least two RF coils is in dependence on the desired SENSE reduction direction." [See **Pruessmann et al.**, RESULTS page 957 col. 1 through page 958 col. 2].

33. It would have been obvious to one of ordinary skill in the art, at the time that the invention was made that the geometrical arrangement of coils in the **Burl et al.**, apparatus would also have a "selection and/or combination of the RF signals of at least two RF coils is in dependence on the desired SENSE reduction direction", when implemented in a SENSE procedure, because the coil arrangements taught in col. 5 lines 23-49 of **Burl et al.**, suggest geometrical arrangements of two, four, or more combined coils based on the geometrical anatomy to be imaged, therefore if the **Burl et al.**, reference was modified to include the teachings of **Pruessmann et al.**, SENSE methodology the limitation of combining signals based on the desired SENSE reduction, for a specific portion of patient anatomy would fall within the scope of the **Burl et al.**, reference.

34. The prior art made of record and not relied upon is considered pertinent to applicant's disclosure.

- A) Misic** US patent 6,356,081 B1 issued March 12<sup>th</sup> 2002, filed November 24<sup>th</sup> 1999, which discloses another type of MRI apparatus similar to Burl et al, with quadrature and phased array system. [See all figures and the entire disclosure as the individual coils and receivers may be individual or combinations of one another.
- B) Bock et al.**, US patent 6,549,999 B2 issued April 15<sup>th</sup> 2003, filed April 18<sup>th</sup> 2001, which shows an apparatus and method for concurrent MRI of Multiple objects; especially figures 1, 2a, 2b and 6.
- C) Bock et al.**, US patent application publication 2002/0156362 A1 which corresponds to the **Bock et al.**, patent above.
- D) Matsunaga** US patent 5,951,474 issued September 14<sup>th</sup> 1999, which shows an MRI apparatus with combined and individual RF coils.
- E) Van Heelsbergen** US patent 5,861,749 issued January 19<sup>th</sup> 1999.
- F) Felmlee et al.**, US patent 6,469,506 B1 which shows multiple sets of two receiver coils in an MRI phased array coil where the signals from one coil or set are combined to form a single output image signal from the array of coils.

### Conclusion

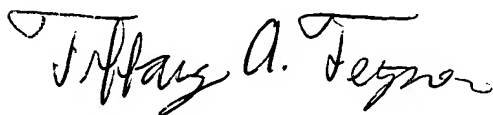
35. Any inquiry concerning this communication or earlier communications from the examiner should be directed to Tiffany Fetzner whose telephone number is: **until January 27<sup>th</sup> 2003** (703) 305-0430. After **January 27<sup>th</sup> 2003** (571) 272-2241. The examiner can normally be reached on Monday-Thursday from 7:00am to 4:30pm., and on alternate Friday's from 7:00am to 3:30pm.



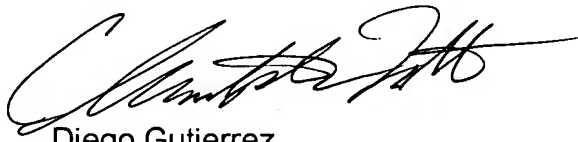
Art Unit: 2859

36. If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Diego Gutierrez, can be reached on (703) 308-3875: **until February 10<sup>th</sup> 2003** After **February 10<sup>th</sup> 2003** (571) 272-2245. The **only official fax phone number** for the organization where this application or proceeding is assigned is **(703) 872-9306**.

37. Any inquiry of a general nature or relating to the status of this application or proceeding should be directed to the receptionist whose telephone number is (703) 305-0956.



TAF  
January 23, 2004



Diego Gutierrez  
Supervisory Patent Examiner  
Technology Center 2800

**CHRISTOPHER W. FULTON**  
**PRIMARY EXAMINER**